

ticle, the β particle can be stopped or entrapped by a molecule when travelling at a very high speed.

When the great energy of motion of the α particle and the small amount of energy absorbed in ionising a single molecule are taken into consideration, there appears to be no doubt that the α particle, as Bragg pointed out, actually passes through the atom, or rather the sphere of action of the atom which lies in its path. There is, so to speak, no time for the atom to get out of the way of the swiftly moving α particle, but the latter must pass through the atomic system. On this view, the old dictum, no doubt true in most cases, that two bodies cannot occupy the same space, no longer holds for atoms of matter if moving at a sufficiently high speed.

There would appear to be little doubt that a careful study of the effects produced by the α or β particle in passing through matter will ultimately throw much further light on the constitution of the atom itself. Work already done shows that the character of the absorption of the radiations is intimately connected with the atomic weights of the elements and their position in the periodic table. One of the most striking effects of the passage of β rays through matter is the scattering of the β particles, i.e. the deflection from their rectilinear path by their encounters with the molecules. It was for some time thought that such a scattering could not be expected to occur in the case of the α particles in consequence of their much greater mass and energy of motion. The recent experiments of Geiger, however, show that the scattering of the α particles is very marked, and is so great that a small fraction of the α particles, which impinge on a screen of metal, have their velocity reversed in direction and emerge again on the same side. This scattering can be most conveniently studied by the method of scintillations. It can be shown that the deflection of the α particle from its path is quite perceptible after passing through very few atoms of matter. The conclusion is unavoidable that the atom is the seat of an intense electric field, for otherwise it would be impossible to change the direction of the particle in passing over such a minute distance as the diameter of a molecule.

In conclusion, I should like to emphasise the simplicity and directness of the methods of attack on atomic problems opened up by recent discoveries. As we have seen, not only is it a simple matter, for example, to count the number of α particles by the scintillations produced on a zinc sulphide screen, but it is possible to examine directly the deflection of an individual particle in passing through a magnetic or electric field, and to determine the deviation of each particle from a rectilinear path due to encounters with molecules of matter. We can determine directly the mass of each α particle, its charge, and its velocity, and can deduce at once the number of atoms present in a given weight of any known kind of matter. In the light of these and similar direct deductions, based on a minimum amount of assumption, the physicists have, I think, some justification for their faith that they are building on the solid rock of fact, and not, as we are often so solemnly warned by some of our scientific brethren, on the shifting sands of imaginative hypothesis.

NOTES.

A MEETING of the permanent commission of the International Association of Seismology will be held at Zermatt on August 30, under the chairmanship of Prof. Arthur Schuster, F.R.S. At this meeting reports will be presented from a number of committees, appointed at the last general meeting, which took place at The Hague in 1907, and questions of organisation will be discussed. Papers will be read by Mr. H. F. Reid, on some lessons of the Californian earthquake and a method of foretelling certain earthquakes; by Mr. Albert Heim, on the objects of earthquake investigations; and by Prof. Palazzo, on a projected seismic triangulation by means of wireless telegraphy. The Central Government of the Confederation has charged the Swiss Naturforschende Gesellschaft with the organisation of the meeting, and arrangements have been made for the

accommodation of the delegates taking part in the conference, who will also be able to travel on the railway between Visp and the Gorner Grät at half fares.

ON Tuesday next, August 31, at the ordinary fortnightly meeting of the Royal Horticultural Society, Vincent Square, S.W., there will be exhibited on behalf of Prof. Sargent and the president and fellows of Harvard University, Cambridge, Mass., U.S.A., a selection of photographs illustrating the flora, fauna, and scenery of central and western China. These photographs are from the large collection taken by Mr. E. H. Wilson during his last (third) journey to China. The exhibit will be of importance to all who are interested in the recent new plant introductions from China; it is also hoped that from its varied character the selection made will appeal to a wider circle. The photographs are whole-plate size ($8\frac{1}{2} \times 6\frac{1}{2}$ inches), with liberal mounts for herbarium purposes, and all are labelled. The work of developing and printing has been done by the well-known worker in floral photography, Mr. E. J. Wallis, of Kew.

THE preliminary mineralogical and geological survey of Northern Nigeria, carried out under the auspices of the Colonial Office and the Imperial Institute, has just been completed by Dr. J. D. Falconer after five seasons' work. Valuable deposits of tinstone have been located within the Protectorate, as well as less important occurrences of gold, argentiferous galena, monazite, and numerous ores of iron. The economic results of the survey are being issued as colonial reports by Prof. Dunstan, while the scientific results will be published by Dr. Falconer in the course of the coming winter. Important observations have been made as to the age and origin of Lake Chad and the Bauchi plateau, while sufficient data have been secured for the compilation of a geological map of the Protectorate which will largely fill up the existing blank in our knowledge of the structure of this portion of the Central Sudan.

MR. ASQUITH announced in the House of Commons on August 19 that the Government has decided to recommend Parliament to make a grant of 20,000*l.* in aid of the expenses of Mr. Shackleton's expedition in Antarctic regions. Mr. Shackleton has informed a Press representative that this sum will meet all his guarantees. The total cost of the expedition is said to have been nearly 45,000*l.* Of this amount, 6000*l.* was subscribed in Australia and New Zealand, and the rest was provided by Mr. Shackleton's friends. In a letter communicating the decision of the Government to Mr. Shackleton, the Prime Minister said:—"The Government have been induced to take this course as they are much impressed both by the great value of the discoveries made in the course of your voyage and by the efficient and economical manner in which the whole of the enterprise was conducted, as is shown by the fortunate return of your entire party, and by the comparatively small total outlay incurred."

WE learn from *Science* of the death, in his eighty-third year, of Dr. R. E. C. Stearns, known for his work on the geographical distribution and variation of mollusca and for other work in natural science.

THE death is announced, in his sixty-seventh year, of Dr. Otto von Bollinger, rector of the University of Munich and professor of general pathology and pathological anatomy in the University. Prof. von Bollinger was the author of a number of medical works, among them being books on meat poisoning and on the heredity of diseases and the "Atlas und Grundriss der pathologischen Anatomie," which appeared in 1896.

THE daily papers announce that the Select Committee on the Daylight Saving Bill has adopted a report approving the principle of the proposals made, but adverse to legislation which would make the seasonal change of time obligatory. The committee has arrived at the conclusion that the principle, if applied compulsorily, would tend to cause serious dislocations in certain industries, such as agriculture and railways, where an alteration in the hours of labour would cause great confusion. The hope is expressed, however, that the principle of daylight saving will be adopted voluntarily in cases where it is found to be practicable and desirable.

THE Berlin correspondent of the *Times* reports that the fifth International Dental Congress opened its proceedings there on Monday, August 23, under the presidency of Prof. O. Walkhoff, of Munich. In his opening address Prof. Walkhoff referred to the increasing recognition of the public importance of dental surgery, which no longer holds a subordinate place in the field of science. Prof. Waldeyer, director of the anatomical institute of the University of Berlin, referred to the important problems which dental surgery embraces in anatomy, physiology, pathology, and palæontology.

AN "American colony" of a very interesting character has recently been installed near Guildford, in Surrey, where an attempt is being made to acclimatise the American robin (*Merula migratoria*) in England. Seventeen birds—nine cocks and eight hens—were imported last spring, and after being kept for a short time in a large open-air aviary, all, with the exception of two or three pairs, were liberated about the middle of June. They mated immediately, and began nest-building almost at once. The nests—coarse, bulky constructions—were placed in trees, with little attempt at concealment, and clutches of from four to five blue eggs, about the size of those of the thrush, were laid. Old and young, the birds now number between forty and fifty. Fears are entertained that at the approach of winter these robins, impelled by their strong migratory instinct, will leave England and become hopelessly dispersed; but those who know the nature of the birds are confident that by feeding them abundantly as cold weather draws on they can be induced to remain as permanent residents. They are cheery birds, their "Kill 'em, cure 'em, give 'em physic" being the climax of optimism.

It is matter of just reproach against our statesmen and administrators that, in devising and carrying out measures intended for the amelioration of social conditions, they are very commonly blind to the teachings of science. This point is well brought out in a striking article by Mr. E. B. Iwan-Müller in the August number of the *Fortnightly Review*. In the course of his article, which is entitled "The Cult of the Unfit," the writer argues with great effect that, judged by the standard of biological principles, much recent legislation must be condemned as ill-adapted for its purpose and likely to be harmful in its results. Socialism, he maintains, and any legislation tending in that direction, runs directly counter to all the lessons that can be derived from the contemplation of evolution by struggle and survival. "The new Trades Unionism aims at the establishment and endowment of mediocrity by the elimination of competition." The facts of parasitism and other causes of degeneration are dwelt upon, and stress is laid on the warning they convey against the policy of making the conditions of life too easy—a warning still needed, though not now delivered for the first time. Apposite quotations are given from Sir E. Ray Lankester's Romanes lecture at Oxford. While opinions may differ as to Mr.

Iwan-Müller's applications, there can be no doubt that his plea for a recognition of scientific principle on the part of our public men is both reasonable and necessary.

THE Pasteur Institute of Paris will receive in a few days the sum of 1,200,000*l.* which was bequeathed to it by the late M. Osiris. The Paris correspondent of the *Daily News* describes the following interesting circumstances relating to this generous gift. M. Osiris founded in 1903 a triennial prize of 4000*l.* to be bestowed on "the person who had rendered the greatest service to the human race during the three preceding years." The prize was awarded to Dr. Roux, the head of the Pasteur Institute, for the discovery of the anti-diphtheria serum, which has been the means of saving the lives of many thousand children, and the whole of the money was made over by him to the institute. M. Osiris was struck by the unselfish conduct of the man of science, and asked him one day why he had given the money to the institute. "All that I am," replied Dr. Roux, "I owe to the Pasteur Institute, for all my experiments and discoveries have been made there. Besides, the institute is very poor, for we have no income except what we make by the sale of serum, and though that brings in enough to keep the establishment going, some fresh remedy may any day be discovered, in which case I fear the institute would have to close its doors for want of funds." M. Osiris said nothing at the time, adds the *Daily News* correspondent; but at his death, which occurred a year or two afterwards, it was found that he had left the bulk of his wealth to the Pasteur Institute as a token of admiration for the scientific attainments and self-abnegation of Dr. Roux.

No. 4 of vol. i. of the ornithological publications of the Field Museum of Natural History is devoted to a catalogue of birds from British East Africa, by Mr. N. Dearborn.

In vol. vi., No. 4, of the University of Colorado Studies Prof. T. D. H. Cockerell describes and figures a skull of a ground-sloth from Colorado provisionally referred to the genus *Mylodon*. It differs from *Paramylodon*, of the Nebraskan Pliocene, by having the normal five in place of four pairs of upper cheek-teeth.

WE have to acknowledge the receipt of vols. xxx. (1907) and xxxi. (1908) of *Mémoires de la Société des Naturalistes de la Nouvelle-Russie*, Odessa. In the former, Dr. A. Brauner points out that while naturalists regard the green-headed starling of Western Europe as the true *Sturnus vulgaris* of Linnæus, and class the purple-headed bird as distinct, under the name of *S. intermedius*, the latter, as occurring in Sweden, should properly be called *S. vulgaris*. Hence the English starling requires another designation.

THE articles in the July number of the *National Geographic Magazine* are mostly devoted to Alaska and its products, General Greely opening the subject with an account of the economic evolution of Alaska, while Mr. T. Riggs follows with the story of marking the Alaskan boundary, and Messrs. R. H. Sargent and W. H. Osgood respectively discuss the mountains and the big game of the country. In the last of the articles referred to special attention is directed to the uncertainty still existing with regard to the number of forms of Alaskan brown bears.

WE have received the monthly journals of the Meteorological Society of Japan for the first half of this year. These contain notices of recent conspicuous meteorological occurrences, and articles on climatological and other interesting subjects, among which is a discussion of the winds on the east coast of Asia, by Mr. M. Ishida, which runs through several numbers. The practice of summarising

the more important articles in a European language has been discontinued; this considerably lessens the usefulness of the journals, so far as western readers are concerned.

In the July number of the *Museums Journal*, Dr. E. Howarth records his resignation of the editorship, a position he has filled for the last eight years. When that periodical was started in 1901, early failure was predicted; but the prediction has proved altogether untrue, and the *Museums Journal* is now established on a firm, and, it is hoped, lasting base. The issue also contains Mr. Henry Balfour's presidential address, delivered at the Maidstone meeting on July 13th, in which the need for a national museum of British ethnology is strongly advocated. "What is required is a National Folk-Museum, dealing exclusively and exhaustively with the history of culture of the British nation within the historic period, and illustrating the growth of ideas and indigenous characteristics. Until such an institution is founded, there will remain a very serious *lacuna* in the list of our museums, and we shall remain open to the fire of just criticism from other countries, on the score of our almost pathetic anxiety to investigate and illustrate the ethnology of other races and peoples, while we neglect our own."

ZOOLOGICAL students are much indebted to Prof. Spengel for the publication of that very useful and interesting journal, the *Ergebnisse und Fortschritte der Zoologie*, the second part of the second volume of which has just reached us. This part contains two important memoirs of general interest. The first is a very complete and valuable *résumé* of our present knowledge of sponge spicules, by Prof. E. A. Minchin. The spicules of sponges are amongst the most beautiful and at the same time the most incomprehensible objects with which the microscopist has to deal, and a considerable amount of light has lately been thrown upon their nature and origin. Prof. Minchin himself is one of the foremost investigators in this department, which modern methods of research have raised to the level of a branch of cytology. The subject, indeed, is one which of recent years has attracted much attention, and given rise to no little controversy amongst spongologists, and specialists and non-specialists alike will be interested in Prof. Minchin's essay. The second paper in the same journal deals with the excretory organs of invertebrates, our knowledge of which has also progressed by leaps and bounds during the last few years. The author, Prof. Meisenheimer, confines himself for the present to protonephridia and typical segmental organs, drawing largely for his information upon the classical and pioneer work of Mr. Goodrich, especially with regard to solenocytes.

THE July number of the Transactions of the Royal Scottish Arboricultural Society contains a large quantity of information useful to forest owners as well as to foresters. Articles from many able pens deal with afforestation, and we need only mention the names of Lord Lovat, Mr. Munro Ferguson, Dr. Nisbet, Profs. Somerville and Schlich. The report of the Royal Commission on Afforestation from a landowner's point of view, by Sir John Stirling Maxwell, contains many useful hints. A report is given of a lecture on trees of California, by Mr. F. R. S. Balfour, delivered to the society, as well as a report of an excursion to Forglen and Hatton, made by the Aberdeen Branch of the society. The volume also contains interesting notes and queries, reviews and notices of books, and altogether it is full of information likely to be of interest to foresters. The price of the volume is 3s.

THE first portion of an account dealing with mitosis in higher plants, communicated by Dr. H. A. Haig, is NO. 2078, VOL. 81]

published in the August number of *Knowledge and Scientific News*. A full description is given of methods and materials examined, so that readers, if disposed, may make their own preparations. The first chapters deal with technique and the early stages of division in the cells found near the root-apices of *Hyacinthus* and *Allium*.

THE botanists in the Philippine Islands are vigorously prosecuting their identifications of indigenous plants, in pursuance of which Dr. C. B. Robinson publishes in the first part a revision of Philippine Phyllanthineæ and Mr. E. D. Merrill contributes revisions of the families Connaraceæ and Lorantheæ to the second part of the botanical section of the *Philippine Journal of Science* (vol. iv.). Dr. Robinson accepts the separation from *Phyllanthus* of *Glochidion*, which becomes a large genus by reason of several species established by Mr. Elmer and the author. Six genera are recognised by Mr. Merrill for the Lorantheæ, including the segregation of *Phrygilanthus* and a new genus, *Cleistolanthus*. The number of endemic species is inordinately great, as out of forty-three species of *Loranthus*—the only large genus—no fewer than thirty-six are endemic.

DR. M. RACIBORSKI contributes to the *Bulletin international de l'Académie des Sciences de Cracovie* (March) a long series of descriptions of parasitic and epiphytic fungi collected and examined in Java. A peculiar formation of the basidium was observed in *Cintractia*, as it is abstricted directly from the resting spore, and is at once shed; three or more septa are formed in the basidium, and each cell gives rise to a basidiospore. The group of *Septobasidiæ* furnishes some of the commonest epiphytes. The Javanese species are separated by the author into three genera; *Ordonia* is characterised by a fibrous mycelium and absence of a special hymenial layer; *Mohortia* has a sterile layer below the hymenium, while *Septobasidium* develops three distinct layers. Several of the new species fall into the families *Microthyriaceæ* and *Sphæriaceæ*.

THERE are several noteworthy points in the revision of the American group of *Thibaudiæ*, a section of the family *Ericaceæ* communicated by Mr. R. Hörold to Engler's *Botanische Jahrbücher* (vol. xlii., part iv.). It provides an independent account of a section which was required to correlate the diverse views of Hooker and Klotzch. In this respect the author follows the latter in splitting the large genus *Thibaudia*. The classification of the genera based on staminal characters furnishes an interesting study in the variation of this organ, which is a special characteristic of the family; modifications of apical dehiscence are indicated in a text-figure. A list of new plants includes one genus and many additions to the genera *Cavendishia*, *Psammisia*, and *Thibaudia*. In addition, the author sketches the main features in the geographical distribution of the genera.

WE are in receipt of several important bulletins from the Wisconsin Agricultural Experiment Station dealing with subjects of considerable agricultural interest. Messrs. Whitson and Stoddart discuss the importance of phosphates in fertility, and show that the tendency of the local system of farming has been to deplete the stock of phosphates in the soil. Some of the soils are acid, and it is pointed out that acidity and lack of available phosphates usually go hand in hand. In such cases naturally occurring calcium phosphate gives excellent crop returns, and does not require the preliminary treatment with sulphuric acid usually given; fortunately, large deposits of rock phosphate occur in Florida, and can be purchased

by farmers at low prices. Two bulletins by Messrs. Russell and Hoffmann deal with bovine tuberculosis. This disease has appeared in Wisconsin, and has spread, especially in the southern parts of the State, where more than 43 per cent. of the herds are infected. The most common mode of herd infection is through the purchase of infected animals, and State regulation is strongly recommended. In another bulletin Mr. Sandsten gives the results of experiments, which are said to have been entirely satisfactory, on the improvement of Wisconsin tobacco through seed selection. The "King" system of ventilating barns and cow-sheds is described in Bulletin No. 164. Its essential feature is that fresh air is introduced by means of flues running in the walls from the bottom to the top of the barn, and thus enters the building from above, whilst the foul air is withdrawn by flues running from the bottom to the top of the building, and terminating outside in a ventilator. This inversion of the ordinary system is said to work well, without draught and without great loss of temperature.

MR. E. PHILIPPI, of Jena, justly observes that the stratified structure of rocks is one of the phenomena that remain inadequately explained on account of their very familiarity. In a paper, "Über das Problem der Schichtung und über Schichtbildung am Boden der heutigen Meere" (*Zeitsch. deutsch. geol. Gesell.*, Bd. 60, 1908, p. 346), he summarises what is already known as to the bedding of sediments in waters at some distance from a coast, and urges that the German South Polar Expedition has shown stratification to be the rule and not the exception in such materials. Globigerina ooze, for example, seems regularly to contain more terrigenous matter, and to be poorer in calcium carbonate, 30 cm. or so below its surface, and Philippi attributes this to the former greater extension of the antarctic ice, with consequent production of drift. Climatic changes are probably the normal causes of stratified structure in deep-sea deposits. Deep-sea sands are ascribed to the weathering of submarine slopes and of ridges formed of solid rock, some of which may only recently have been forced towards sea-level. As new earth-ridges rise in submarine areas, new material from them gathers in the concomitant geosynclinals. Regular changes in the character of strata may thus indicate a periodicity in crust-movement in the past.

THE *Philippine Journal of Science* for December last is given up to an elaborate somatological study of the Benguet Igorots, a tribe occupying the Benguet and Lepanto-Bontoc provinces of Luzon, by Mr. R. B. Dean, of the Anatomical Laboratory, Manila. The result is that the writer is able to distinguish four groups:—Tall dolichocephalic types with long arms; small dolichocephalic with short arms; mixed mesocephalic; and brachycephalic with intermediate arm form. One example, of which an illustration is given, is of a type curiously European in appearance. The race, it is clear, has been subjected to repeated modification by the introduction of new varieties. The original type seems to have been small and dolichocephalic, with relatively short arms, conjoined with a brachycephalic element, which became mingled with the former and partially fused. Upon these people intruded a tall, dolichocephalic, long-armed race; and the process of fusion was continued uninterruptedly up to quite recent times. At present the brachycephalic race is more distinct as a type than either the tall or small dolichocephalic people, and they are also present in larger numbers. The memoir, which is fully illustrated and provided with full statistical apparatus, supplies a singularly interesting example of race fusion, and may be expected to throw much light on the

ethnological history of the Philippine Islands and the cognate races of that region.

In the August number of *Man* Mr. W. G. Smith discusses the character of the eoliths said to have been found in association with remains of *Elephas meridionalis* in undisturbed beds at Dewlish in Dorsetshire. This discovery has been assumed by Dr. C. A. Windle and others to prove the existence of man in the Pliocene period. Mr. Smith shows that the evidence of the association of these eoliths with remains of the Pliocene period is more than doubtful. He has examined the remains found at Dewlish by the Rev. Osmund Fisher, and finds that one of them is an undoubted sponge of the Cephalitis order, while none of the others, in his opinion, exhibit the faintest trace of human work. The case of the flints found in the same locality by Dr. Blackmore in 1814 is similar; and an iron stain on one example suggests that it was a surface find. He sums up the question as follows:—"If bulbed flakes of undoubted human origin have been found at Dewlish (none were sent to me) with *Elephas meridionalis*, this cannot prove that the elephant and the stones are Pliocene in age; it only suggests that the elephant had survived into Palæolithic times, for the sufficient reason that Dewlish is an old and well-known locality for Palæolithic implements. It is mentioned in Evans's 'Stone Implements,' ed. i., 1872, p. 559, and ed. ii., 1897, p. 638. I have not written this and former notes on 'eoliths' in an attempt to show that a Pliocene ape-man probably never existed. It is, to me, possible that such an animal did live somewhere in pre-Glacial and Pliocene times. When the evidence—geological, osteological, and archæological—is conclusive, I shall be one of the first to accept it."

It has been shown experimentally that the incidence of β or γ rays from a radio-active substance on a dielectric increases its conductivity, and Dr. H. Greinacher, of the University of Zürich, describes, in the July number of *Le Radium*, his endeavours to detect a corresponding effect in the case of the α rays. The rays were derived from a layer of polonium, and fell on the dielectric of a condenser placed in series with an electrometer and a battery of storage cells. Although at first a considerable increase of the conductivity of the dielectric appeared to be produced when the radiation fell on it, Dr. Greinacher finally traced the effect to the improved contact between the dielectric and the electrodes of the condenser, and found no effect of the radiation on the conductivity. This he attributes to the closeness of the ions together in a solid, and the rapid re-combination of them which in consequence ensues.

THE best method of determining an electrical resistance in absolute measure has hitherto been that of Lorenz, but in the Bulletin of the Bureau of Standards for May, Mr. E. B. Rosa proposes to substitute for it a method which depends on the revolution of a coil in the magnetic field due to an electric current in another fixed coil. The fixed coil consists of two portions set a little further apart than in the Helmholtz galvanometer. The revolving coil consists also of two parts wound in planes at right angles to each other. The balancing is done by means of a differential galvanometer provided with three coils. Of these, two are each in series with a part of the revolving coil, and the third is connected to the ends of the resistance to be measured, which is in series with the fixed coil. By means of this apparatus Mr. Rosa hopes to obtain an accuracy ten times that which has been obtained with the Lorenz apparatus.

We note from an article on machine-tool practice in the *Engineering Magazine* for July an interesting example of

the standardisation of lathe and planer tools on a large scale. A central tool-dressing plant has been established recently at the Philadelphia Navy Yard, which supplies high-speed lathe and planer tools to all navy yards on the Atlantic coast. These tools are forged, treated, and ground to standards. Each of the various yards is equipped for re-grinding the tools until they require re-dressing, when they are returned to the central tool-dressing plant at Philadelphia for replacement by newly dressed tools. The advantages of this system are that all yards are equipped with tools of standard shapes and of uniformly high quality, and as the forging, dressing, and grinding of tools are done in large lots, substantial reductions in cost result.

THE necessity for keeping records of the steam consumption in the various prime-movers in use in large factories and generating stations has given a stimulus to the development of means of measuring and recording automatically the flow of water. In the Lea water-recorder, illustrated in *Engineering* for August 13, advantage is taken of the accuracy of the Thompson V-notch, the magnitude of the angle of the notch being selected to suit the flow. The recording arrangement consists essentially of a float having a vertical rod attached to it; a rack on this rod gears with a pinion fixed to the spindle of a horizontal drum. The angle of rotation of this drum will therefore be proportional to the head of water over the notch. A spiral wire coil or screw thread is wound round the drum, and has a contour similar to the curve of flow for the notch, this curve being plotted with head for abscissæ and gallons or pounds per hour for ordinates. A bar capable of sliding parallel to the axis of the drum is actuated by the spiral on the drum, and has an arm carrying the recording pencil. The movement horizontally of the pencil will therefore be a measure of the quantity of water flowing per hour. The record is made on a chart wrapped round a drum which is clock-driven; hence the total flow in a given time is easily ascertained by means of a planimeter. The makers are the Lea Recorder Company, 28 Deansgate, Manchester.

THE tenth edition of Messrs. Townson and Mercer's catalogue of scientific apparatus for physical laboratories should prove of service to science masters and others. The volume runs to 413 large pages, and contains well-illustrated information of a great variety of instruments designed to be of assistance in giving instruction in all branches of physics. Some parts of the catalogue, with their full descriptions and well-executed drawings of important pieces of apparatus, partake of the character of a practical textbook of physics. Teachers in charge of physical laboratories should see that a copy of the catalogue is added to their works of reference.

WE have received from the Geographical Model Works, Middlesbrough, a photograph of a hypsometrical model of the district of Ingleborough, near Settle, by Mr. J. Foster Stackhouse. The model is said to be correct within 2 feet of the actual district dimension at every part. The area covered is 42 square miles, and the horizontal scale 6 inches to a mile. Vertically, the measurements are one-sixteenth of an inch to every 25 feet. The model is built up of a series of ninety-four layers of cardboard, and between 500 and 600 pieces were used in its formation. The weight of the model in its complete state is above a hundredweight and a half. Accurate full-size copies of the model are now available, and particulars concerning them may be obtained on application to the offices of the Geographical Model Works at Emerson Chambers, Blackett Street, Newcastle-on-Tyne.

NO. 2078, VOL. 81]

OUR ASTRONOMICAL COLUMN.

COMET 1909b (PERRINE'S, 1896 vii.).—The re-discovery of Perrine's, 1896 vii., comet by Herr Kopff is confirmed by a notice in No. 4347 of the *Astronomische Nachrichten*, where it is stated that perihelion passage should occur about October 31.35 (Berlin M.T.). This comet, according to Herr Ristenpart, passed through perihelion for the first time since its discovery in 1896, in April, 1903, but, owing to its small angular distance from the sun, was not found at that return. According to an ephemeris given by Prof. Kobold in No. 4348 of the *Astronomische Nachrichten* (p. 62, August 18), the position of the comet on August 26 will be $\alpha = \text{oh. } 49.3\text{m.}$, $\delta = +42^\circ 35'$, and it is travelling in a direction parallel to, and slightly north of, the line joining ν and δ Andromedæ; since its discovery on August 12 the magnitude has increased 0.5. A photograph of this object was obtained at Greenwich on August 14.

THE RECENT PERSEID SHOWER.—Further observations of the recent display of Perseids are published in the *Yorkshire Weekly Post* for August 21 by Mr. J. H. Elgie, of Leeds. A number of bright meteors was seen by him, between 11 p.m. and midnight, on August 11, and he gives the positions of the limits of their tracks. The brightest object seen appeared at 11.30, and, increasing in brightness, travelled from $210^\circ, +35^\circ$ to $222.5^\circ, +10^\circ$. A number of the meteors observed appeared to radiate from a small group of stars which includes β and ξ Draconis. A party of four observers at Sandfield, Moor Allerton, saw 105 meteors between 11h. and 11h. 45m. p.m. on August 11, and one of the party, Mr. J. C. Jefferson, considers it the finest display he has seen since 1866. Another observer, Mr. E. Hawks, of Leeds, recorded 175 meteors between 9 p.m. on August 11 and dawn on August 12.

THE SPECTROSCOPIC BINARY β ORIONIS.—The radial velocity of Rigel was first determined at Potsdam in the years 1888–91, and variability was suspected, but the measures were not sufficiently definite to confirm the suspicion. Similarly, Frost and Adams obtained a range of about 8.5 km., and Campbell and Curtis suspected one of 10 km., but in neither case were the results considered sufficiently definite to affirm the variability of the velocity. Results now published, by Mr. J. Plaskett, in No. 1, vol. xxx., of the *Astrophysical Journal* (July, p. 26), show, however, from 275 plates taken on fifty-five nights in 1908–9, that the star is probably a binary, with a period of velocity-variation of about 21.90 days. There is, further, a variation of amplitude which suggests the interference of a third body, and may account for the difficulties encountered by the previous observers, but more evidence must be obtained before this can be considered certain.

The elements now published give the eccentricity as 0.296 ± 0.059 , the range of velocity as $+26.09$ km. to $+18.55$ km., the velocity of the system as $+22.616 \pm 0.158$ km., and the length of the semi-major axis of the orbit as 1,108,900 km. These results are based on the measures of the three lines Mg $\lambda 4481$, He $\lambda 4472$, and H γ $\lambda 4341$.

EPHEMERIS FOR COMET 1909a (BORRELLY-DANIEL).—An ephemeris for comet 1909a is published by Dr. M. Ebell in No. 4347 of the *Astronomische Nachrichten* (p. 42, August 13). As the present brightness is given as 0.07, that at discovery being taken as 1.0, it is unlikely that this object will be observed again except with the largest telescopes or by photography.

MAXIMUM OF MIRA, 1908.—Mr. Naozo Ichinohe, having observed the magnitude of Mira Ceti during the period which included the last three maxima, publishes the results of his observations in No. 4346 of the *Astronomische Nachrichten*, the measures made during the period October, 1907, to February, 1909, being given in detail. The following table shows the observed dates of, and magnitudes at, the maxima, and compares the dates with those calculated by Guthnick:—

Guthnick	Observed date	Magnitude
1906, Dec. 19.6	Dec. 12	2.00
1907, Nov. 15.5	Nov. 1	3.60
1908, Oct. 11.3	Oct. 11	3.33